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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/755,843	01/12/2004	Orlin Velev	5051-668	8437
20792 7590 06/18/2008 MYERS BIGEL, SIBLEY & SAJOVEC PO BOX 37428 RALEIGH, NC 27627				
EXAMINER				
OLSEN, KAJ K				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
06/18/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/755,843

Applicant(s)

VELEV, ORLIN

Examiner

KAJ K. OLSEN

Art Unit

1795

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4-19 and 21-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-19 and 21-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. In view of the arguments filed on 4/14/2008, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795.

Claim Inquiry

2. The examiner notes that claims 13 and 14 depend from claim 11, but the examiner questions if these claims should actually depend from claim 1. In particular, claims 33 and 34, which are the parallel method claims to device claims 13 and 14, depend from the independent

claim 18 and not from one of the dependent claims. Moreover, there is nothing in the specification to indicate that the limitations of claims 13 and 14 are particular significant for the conductive ring embodiment of claim 11.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 4-8, 10, 12, 16-19, 21-25, 27-30, 32, 36, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder (USP 4,390,403). Batchelder is being cited and relied on for the first time with this office action.

5. Batchelder discloses a device and method for the manipulation of a suspended particle in an electric field gradient comprising a plurality of electrically isolated electrodes 44 on a surface 46 where said plurality of electrodes is configured to provide an electric field gradient for transporting the suspended particle. See fig. 5A and col. 2, l. 64 - col. 3, l. 13. With respect to the presence of a liquid composition on the plurality of electrodes, Batchelder teaches that a layer of lubricant can be placed between the electrode surface and the particle being manipulated to keep the particle from adhering to the electrode surface. See col. 4, l. 65 - col. 5, l. 25. Although Batchelder did not explicitly specify the use of a liquid lubricant, lubricants are typically available in liquid form (e.g. hydrocarbon oils). Moreover, lubricants in liquid form would readily and evenly coat the surface of the electrodes because owing to the flow properties of fluid

materials. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to rely on liquid forms of lubricants because these types of lubricants are the most common forms of lubricants and because liquid lubricants would readily coat the surfaces of the electrodes thereby providing the desired barrier to adhesion over the entire device surface. With respect to this liquid compositions covering the said surface continuously, because the purpose of the lubricant is to prevent adhesion of the particles being manipulated (col. 5, ll. 9-13), one possessing ordinary skill in the art would have been clearly motivated to allow said lubricant to coat the surface continuously to prevent the adhesion of particles at all surfaces of the device. With respect to this liquid composition having an exposed surface for suspending the particle, because this lubricant is disclosed as only being present between the device surface and the particles being manipulated (col. 5, ll. 9-17), the liquid composition would have an exposed liquid surface and the particle would be suspended at that surface. Moreover, the particle would clearly not be in direct contact with the electrodes because it is disclosed as being between the particle and the electrode surfaces.

6. With respect to the form of the liquid lubricant, hydrocarbon oils are very conventional forms of lubricants in the art.
7. With respect to the particle being either a solid or a liquid, see col. 3, ll. 47 and 48.
8. With respect to the use of component suspended, dissolved, or solubilized in the droplet, Batchelder teaches that a water droplet may have surfactant dissolved within it. See col. 5, ll. 34-38.
9. With respect to the use of a hydrocarbon droplet, Batchelder teaches the manipulation of octyl alcohol particles. See col. 7, ll. 41-45. With respect to this compound carrying an

additional component, Batchelder already taught earlier that surfactants may be added to the droplet being manipulated in order to control the surface tension of the droplet (col. 5, ll. 34-38). One possessing ordinary skill in the art would clearly have recognized that the surface tension of hydrocarbon particles could be similarly controlled via the use of surfactants and would have yielded the predictable result of hydrocarbon particle with a desired surface tension.

10. With respect to the first and second pathways for combining first and second particles, Batchelder teaches that its device can be utilized for mixing (col. 1, l. 66 - col. 2, l. 29). Fig. 6 and 6A show how such a mixing results from particles moving along different (i.e. first and second) pathways.

11. With respect to the two-dimensional matrix, the embodiment of fig. 6 and 6A has electrodes arranged in a two-dimensional arrangement.

12. With respect to the use of a DC voltage, see col. 3, ll. 55-62. With respect to the voltages relied on, the particular choice of DC voltages will depend on the dielectric properties of the particle being manipulated and the desired manipulation being sought. See col. 2, l. 64 - col. 3, l.

13. Finding the DC voltages that provide the desired level of particle manipulation requires only routine skill in the art.

13. With respect to separating droplets, see fig. 3-3C and col. 6, ll. 25-51.

14. Claims 9, 15, 26, and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder in view of Becker et al (USP 6,294,063).

15. With respect to claims 9 and 26, Batchelder discloses all the limitation of the claims, but did not explicitly disclose a fluid droplet volume. Becker discloses in an alternate dielectrophoretic device that the fluid droplets being manipulated can have diameters that are

between 100 nm and 1 cm. See col. 3, ll. 14-16. This would result in particle volumes ranging from 520 to 5.2×10^{-18} μL , which overlaps the claimed range. Because Becker teaches that dielectrophoretic devices are capable of manipulating particles within the claimed volume range, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the device of Batchelder to manipulate similar particle sizes so as to increase the utility of the device to small particle manipulations.

16. With respect to claims 15 and 35, Batchelder discloses all the limitations of the claims, but did not explicitly disclose the use of AC voltages. Becker also teaches that AC voltages can be utilized for the dielectrophoretic manipulation of particles as well. The voltages and frequencies relied on by Becker overlap the claimed voltages and frequencies. See col. 26, ll. 32-36. One possessing ordinary skill in the art would have recognized that the AC voltages of Becker would have been useable for the dielectrophoretic particle movement of Batchelder because the substitution of one known dielectrophoretic force for another requires only routine skill in the art.

17. With respect to claim 33, Batchelder discloses all the limitations of the claim and further disclosed that the electrodes can be placed on a first side of the surface (fig. 4-5A). However, Batchelder did not explicitly disclose having the leads placed on a second side of the surface. Becker teaches that this is a convenient location for the leads of for the dielectrophoretic device. See fig. 8 and col. 18, ll. 26-43. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Becker for the method of Batchelder because the second side of the surface provides a convenient surface for mounting the leads and additional circuit elements to.

18. With respect to claim 34, Batchelder discloses all the limitations of the claim, but did not explicitly disclose the electrode lengths and distances between adjacent electrodes. Becker teaches the use of electrodes having dimensions of 200 microns (i.e. 0.2 mm) and spacings of 0.2 mm. See col. 5, ll. 1-3. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the dimensions of Becker for the electrodes of Batchelder because the use of known dimensions from the art for the unspecified dimensions of Batchelder requires only routine skill in the art.

19. Claims 11 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder in view of Benecke et al (USP 6,149,789).

20. Batchelder discloses all the limitations of the claims, but did not explicitly disclose the use of an electrode comprising a conductive ring. Benecke teaches that a number of electrode shapes may be utilized for the dielectrophoretic manipulation of particles, including the use of rectangular electrodes (like Batchelder) as well as conductive rings. See fig. 8 and 9 and col. 4, ll. 12-28. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Benecke for device and method of Batchelder because the substitution of one known electrode shape for another known electrode shape requires only routine skill in the art.

21. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder in view of Benecke as applied to claim 11 above, and further in view of Becker.

22. Claims 13 and 14 are rejected over the further teaching of Becker for the reasons set forth for claims 33 and 34 above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAJ K. OLSEN whose telephone number is (571)272-1344. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kaj K Olsen/
Primary Examiner, Art Unit 1795
June 18, 2008